AI In Medicine: Considerations for Building Trust
Transparency, Reproducibility, Performance, Clinical Impact

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BIOMEDICAL IMAGING ML/AI PROJECTS

CADx, INFORMATICS, GLOBAL HEALTH, IMAGE DATABASES, QUESTION ANSWERING,
What do we want AI to be?

• Awesome!

• Transparent
  • As a user: be invisible
  • As a regulator (critic / cynic): not opaque about underlying technology

• Reproducible

• Explainable

• Improve existing processes
Considerations:

• **Data**
  • Acquisition QA
  • Acquisition sensor sensitivity
  • Variety (Prevalence, coinfections)
  • Set Size, image (or datum) resolution
  • Sparsity
  • Relevance – How it answer the question? General AI or Narrow AI?
  • Modality (Data types, temporality)
  • Representing reality? (a perfect, curated and clean data set vs. dirty, real, missing)
Considerations:

• **Algorithm Design**
  - AI Goals (Detection, Staging/Prognosis, Alerting)
  - Clinical purpose (clinician’s aid, human-expert replacement, non-expert guidance)

• **Evaluation & Validation**
  - Evaluation measures – accuracy, recall, precision vs. sensitivity, specificity, and area under the operating curve
  - Role of statistics (sampling vs. exhaustive testing)
  - Training and test data partitioning, and collusion
  - Visualizing learning (internal layers vs. classification stage(s))
  - As the AI systems become more complex, how easily can these be teased out (particularly if the AI is building on prior work.)?
Considerations:

• **Reproducibility**
  • How much non-private data is necessary to reflect AI performance?
  • Transparency in model design, data used, and training and test parameters

• **Development and Performance Consistency**
  • Dependency on GPU hardware,
  • Development platform,
  • Software version (libraries),
  • Data augmentation techniques
Considerations:

• **Impact on Clinical Workflow**
  • Process change necessary?
  • Communicating with other (non-AI / AI) systems; standards

• **End-User Training**
  • User Complacency: “I took the action because the AI said so ...”
  • Value of visualizations

• Continuous learning in AI (feedback), controls
Questions? Thoughts? Comments?